Application of Machine Learning Techniques to develop a speed tracker and an AI-enabled IoT notification management system

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Abstract-In recent years vehicle monitoring has emerged as a critical circumstance. It could become possible if the following system is deployed. This article aims to recommend a system that monitors automobiles traveling at excessive speeds immediately reports them to the corresponding authorities and family members. Currently, the number of road accidents has increased, necessitating the development of the proposed framework that monitors vehicles that are overspeeding. The current system over-speed monitoring management implementation, which employs Artificial intelligence (AI), intelligence system will automatically determine all road traffic data. The vehicle with AI is capable of recording the speed of the vehicle also stores and shares the data with the concerned authorities. The system integrates a radar module, GPS, Google maps, and an AI IoT module. With the help of AI and GPS technology, we can identify safe regions. The electronic monitoring device is provided by 12V lithium batteries and features a GPS sensor Network and AI Implementation. The device battery backup ranges between 5 to 10 hours. In order to reduce the vehicle speed in a specific location as accident-prone zones, an intelligent vehicle over the speeding sensor is utilized in conjunction with the AI enable IoT. Accidents can be avoided if intelligent sensor technology is used to set safety criteria and constraints. Data is sent wirelessly by the system.. The main objective of the proposed Framework is to cut down on the high death rates caused by accidents in India and around the world.

Keywords; Accident prevention system, AI, Smart vehicle monitoring system, vehicle to vehicle interaction, Monitoring

I. Introduction

The main apprehension of a automobile collision is that it is on the list of ongoing disasters that can occur anywhere and at any time. According to the data from the Safte international travel 50 million individuals are wounded and approximately 1.24 million people die every year across the globe. They are indeed the second leading cause of death, according to statistics.To address these issues, several Automotive vehicle industries and car producers have projected speed control tactics to uphold vehicles' sensible distances. In this direction, work is being done to create an effective solution for developing a surveillance driving application for vehicles by deploying AI Technology[1]. AI refers to the interconnectedness of distinct embedded computation devices within the current set-up. AI enables sophisticated system connectivity to the devices and services and includes various contexts and apps. This Interdependence of embedded gadgets, such as Intelligent objects is deployed in all intelligent systems allowing real-time deploment such as smart grids [2].

Problem statement

The objective is to design and develop a new intelligentis to design and develop a new intelligentcar that can be used to stop a vehicle from going too fast. Monitor system that uses AI technology to alert drivers of speeding vehicles. Because of the high number of traffic collisions, which occur on a daily basis, the smart vehicle over speed monitoring system is very important for human life. This gives an overview of an intelligent vehicle for Speed monitoring and it focuses on the features of the exceeding speeding tracker through the use of AI-enabled IoT and ML techniques.

Furthermore, the current study focuses on the different methods to control over speeding radars through a critical examination of the relevant sources. In this study, explains the over-speed tracking technical operation as well as the advantages linked with it. As a result, the projected investigation will serve as a wake-up call for future researchers and academicians as well as provide new insights into the specific topic.

As for the remainder of the document, the following structure has been adopted:.Segment 2 deliberates the related work of the monitoring system. The third segment provides an overview of the proposed system. The methodology is bestowed in segment 4. Finally, segment 5 discusses a brief Conclusion and future scope.

II. Literature review

EBM system was discussed by the author, which notifies the focus in a state of drowsiness. And embedded model relies on the mental stability of focus by monitoring the movements of the eye and head, which are beneficial in notifying the drivers at the drowsiness of the sleep cycle. A Normal blinking of an eye it as no impact on the model outcomes [3].

In [4] scholars have built a computerized system recognition model to track the over the speediness of the vehicle and If it's over speeding, then the particular vehicle license number is removed and it is forwarded to Toll Plaza through mail to indict the penalty. In the paper to measure the speed Doppler effect, the observable fact was applied. The camera captures the image of the over-speeding vehicle, and the license number is removed by employee DIP (digital image processing) techniques. The findings disclosed that the constructed model successfully tracked over speeding vehicles, preprocess the license number, performed efficiently, and perhaps be deployed on roads to test the vehicles over speeding.

The researchers in [5] crafted a revolutionary system capable of detecting speed violations on roads and assisting drivers in conforming to traffic rules by attempting to maintain a speed within the specified speed limit. RFID (Radio Frequency Identification), GSM (Global System for Mobile), and PIC are all mechanisms of the prototype application (18F45K22). This framework has produced stable and inexpensive, effective outcomes as well as authentic notification.

The authors of [6] Installing a new Vibration Sensor Device on motor vehicles was recommended. In the event of a collision, a GPS detector will locate the vehicle's location via resonance and frequency activation. In the event of a collision, a GPS detector will locate the vehicle's location via resonance and frequency activation. The event was immediately reported to Patrolling and Life Assistance in order to locate the mishap and track the dubious using a GPS detector. The researchers calculated vehicle speeds by incorporating accelerometer observations over time and determining acceleration foibles. The outcome was precise and powerful because Extensive testing was carried out in order to determine sensor speed on real driving environments.

The authors [7] had also described a system that can detect reckless driving on highways and alert traffic authorities if there is an infringement. Numerous strategies necessitate human attention and involve multiple attempts that are difficult to execute. The researchers' goal in this article was to recommend a sensor for the automatic recognition and vigilant of unsafe vehicles through patterns associated with traffic violations. The total implementation requires an IR transmitter and receiver, a control circuit, and a buzzer. A buzzer signal alerts the police if the car exceeds the posted speed.

Table: 1 Various approaches for detecting vehicle overspeeding

1	Mohammad Ahmar Khan(2018)	GPS and IoT technologies	• The safety parameters are determined using smart sensor technology.

2	Aishwar ya et al. (2015)	IoT technology is being used to monitor eye blinks.	• Rapid response in order to conduct swift action • Interface that is simple to use • Executable with ease
3	Malik et al. (2014)	System for Automated Speed Detection Using DIP	• Manpower with a rifle is used to inform a Toll Plaza.
4		Speed Infringement Detector for Automobiles Using	• Results that are dependable, affordable, and efficient

	Shabibi, Jayaram an and Vrindav anam (2014)	GSM & RFID Technologies	• It notifies you in real time.
5	Prasant h and Karthik eyan (2016)	Vibration Sensor Devise	• Determine acceleration errors • In the driving situation, the predicted speed is exact and robust.
6	Rangan (2017)	MQ 9 Gas sensor gadget with Internet of Things, GSM, and GPS	• Concept of a green city • Lessen your rapidity and regulate the air pollution

III. Objectives

- To develop a vehicle detector system that is capable of being operated by a smartphone, more precisely an embedded device.
- To design and implement a vehicle tracking system that is both affordable and

effective.
- To design in such a way that it can be utilized for multiple purposes, such as detecting the over speeding, accident location of vehicle, or the accident alarm systems.

IV. Novel framework

The proposed new Vehicle over-speed Monitoring and notification system using AI and ML technology are used for notifying evidence about vehicles over the speed perimeter. This system requires no human intervention and wirelessly transmits data about vehicle speed to authorities charged with overspeeding detection.

The diagram above depicts the architecture of the system for the vehicle speed recognition system. The speed tracking accuracy in this proposed system can be considered using the Radar , Speed App. The accuracy of the road monitor has focused on the landmarks entered into Google Maps, and this detector registers the speed of the vehicle in real-time. Validates it, as well against the assigned speed limits of the specific route on that road. The electronic tracker is powered by 12 V lithium batteries and features a GPS sensor network and AI and ML deployed. This device's battery life ranges from 5 to 10 hours. Server data will be retained for 6 months on a Windows server before being shared for future purpose.. An Android app is used to track the vehicles and send a text message to the designated number.. Exclusive credentials can be used to provide the speed restrictions into an internet application. Exclusive credentials can be used to provide the speed restrictions into an internet application. An error message is displayed when a vehicle exceeds its allotted speed limit.. The important components used in the proposed system are a traffic monitoring center, roadside sensor, an onboard unit (OBU), and RSU for communication in vehicles.

A. Artificial Intelligence

With the variety of electronically stimulated features available throughout most vehicles today, it is easier to connect to them via peripheral IoT and AI devices, which can be useful for capturing valuable data about the vehicle, its motion, its overall health, and a variety of other facets. Our vehicle speed Monitoring Solution assists in the collection and analysis of this data in order to gain insights into condition monitoring, driver behavior monitoring, and other areas. A sensor-based alert system, on the other hand, uses **artificial intelligence (AI) enabled sensors** to rapidly notify road accidents, accidental injury or damage such as vehicle breakdown, over speed and so on, and directs out an alert prompting a notification to the control room or the admin desk to take immediate corrective action. The Internet of Things enables remote control and/or sensing of things over a broadband network, enabling a increased direct interaction of the actual world with mechanisms, leads to improved reliability, efficacy, and financial benefit

B. Module GPS:

For automotive navigation, a GPS (Global Positioning System) direction finding equipment or GPS receiver is utilised. It is responsible for receiving data from GPS satellites and transmitting it in order to accurately anticipate its geographical location. This gadget is capable of retrieving GPS time data and geographic locations in any climate condition, near or distant from the EarthA GPS response requires an unobstructed line of sight (LOS) to multiple or more GPS satellites.A GPS response requires an unobstructed line of sight (LOS) to multiple or more GPS satellites.

Many abstracted GPS tracker are now used in automobiles. GPS functionality in smart phones may be enhanced by the use of A-GPS (Assisted GPS) technology, which may rely on cell towers or base stations to provide gadget location monitoring, predominantly when Gps receivers are unreachable or degraded.

However, A-GPS will not be available if the Smart Phone is not within range of mobile full connectivity.

C. Google Maps:

The Google Maps Road Apps allow you to map Location data to the topography of the highway, as well as recognise the speed limits of the vehicle on roadways. For Google Maps applications, the relevant services are offered:

    i.Snap to Roads:

    Using GPS data, this method produces the best-fit road shape.

    ii.Nearest Roads:

    For a given set of GPS coordinates, it returns a list of road rifts.

    iii.Speed restrictions:

    It retreats the road section's speed limit to its original location.

D. KNN - Euclidean distance

    KNN is one of the supervised learning techniques used in machine learning [25]. It is most commonly used in binary classification. KNN has been used to classify objects based on the closest measure/distance, that is, the proximity between the object and all of the objects in the training phase. The item is classified based on its K-neighbors. Before running the algorithm, the positive integer K is defined.

    The previous and following frame centroids are used to calculate distance. Distance is measured using Euclidean distance. The speed is initially determined using a formula If (x1, y1) in the

first chassis is the centroid of a motor, and (x2, y2) in the second frame is the centroid, the distance is

$$\text{Traveled} = (x2 - x1)^2 + (y2 - y1)^2 \quad (1)$$

V. METHODOLOGY

Every day, a large number of people are killed in car accidents all over the world. Only if the mistake is discovered in time and a penalty is imposed on the scene is life guaranteed. Traffic accidents are a source of concern for people all over the world.
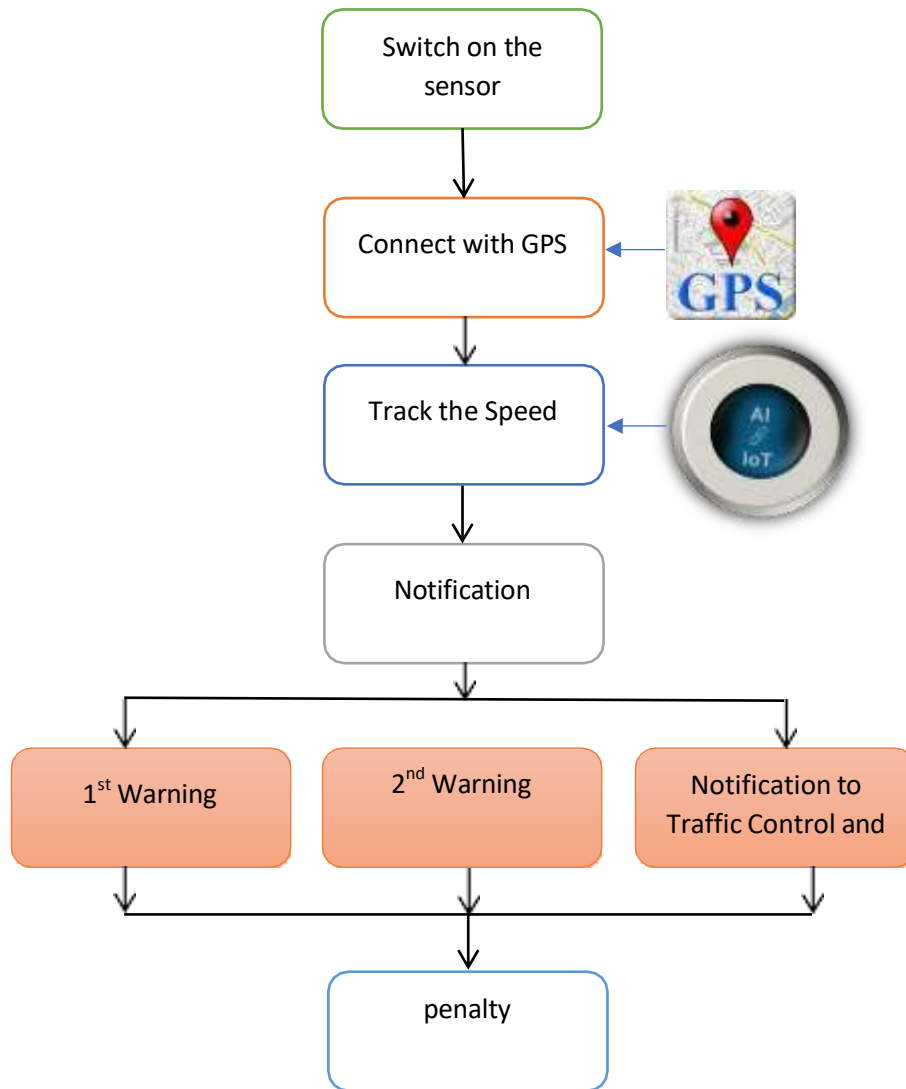

Fig1.Frame Work of Speed Tracker and AI notification Management System

All road traffic accidents result in injuries and deaths, as do accidents caused by a lack of or a global road safety crisis. Accidents involving motor vehicles are the second largest cause of death among adolescents.. Every year, individuals between the ages of 13 and 40 are killed in traffic accidents as a result of careless driving. Automatic speed tracking and notification systems must be built into automobiles. The subject of this paper is the use of an automatic speed tracker in Smartphones via sensor and notification systems. The first phase is the recognition stage, in which the speed of a motor vehicle is observed, and phase 2 is the notification stage, in which the speed is detected and detailed data is sent to the traffic control room and favorite contacts via ML Algorithms.

The system essentially forecasts the time required by a specific vehicle to travel from the origin to a

destination. On the basis of this data, the artificial intelligence (AI) enabled sensors evaluate the speed and position via the Speed App employing Radar.This information is obtained and then wirelessly transmitted to the appropriate authorities in a remote location using AI-enabled IoT technology. The equipment comprises of a GPS sensing module equipped with a transmitter and receiver that transmits the vehicle's speed and location to a remote monitoring system.. The accuracy of road recognition is determined by the names of routes entered into Google Maps, and this existing system tracks the vehicle's speed. The accuracy of road recognition is determined by the names of routes entered into Google Maps, and this existing system tracks the vehicle's speed.The model computes the rapidity of the vehicle and exhibits it on an LCD screen. If an overspeeding vehicle is noticed, the projected toolnotifies the driver, and still if it's observed over speed ,second warning will be notified and then over speeding is detected detailed information is sent to favorite contacts and traffic control room. Speed monitoring accurateness is postulated by Speed App to be between 40 and 80 percent accurate depending on internet speed and connectivity.

VI. Expected Outcomes

Speed Tracker Assisted by Artificial Intelligence The intention of the IoT notification is to construct a new Smart Vehicle Overspeeding Detector that will utilise IoT technology to send out notifications about overspeeding vehicles. Due to the high number of accidents on the road each day, a smart car overspeed detection system is important for human life. Reduces emissions and places a premium on green technology.

VII. Benefits for the society

Without a doubt, our culture places a high premium on driving safety. This begins with well maintained automobiles, but should also encompass checking driver behaviour and enforcing safe driving standards.Since the majority of deaths nowadays occur due to accidents as a result of vehicle overspeeding. Our AI-enabled alert system will make it difficult for the motorist to drop their speed, and if they do not, an overspeeding alert will be sent to the appropriate contacts and authorities. A monetary penalty will be enforced. By adhering to safety requirements, one of the most significant expenses is fuel. Not only is the speed controlled, but the fuel cost is also reduced. Our method will undoubtedly make a significant contribution to lowering the number of people killed in accidents caused by excessive speeding, as well as protecting human life.

VIII. Conclusion

This project addresses the issues of accurately detecting vehicle rapidity in an urban context by leveraging AI-enabled IoT and machine learning technologies in order to support growing vehicular deployments. To achieve a high detection results, the Smart Vehicle Overspeed Detector detects driving behaviours.The Smart Vehicle Overspeed Detector detects driving behaviours in order to attain a high detection rate. The proposed method is utilised to monitor and report overspeeding vehicles to the appropriate authorities in place to avert recurrences of incidents.

Future Scope

The foregoing are future enhancements to the proposed system that could be made by constructing hardware implantations, software algorithms, and interface sensors.
        i. Clarification in drunk-driving cases;

ii. Rash-Driving can be avoided by obstructing the spark plug.

iii. Controlling the speed of an emergency services.

IX. Limitations

The equipment does not tamper resistant, the system may prove ineffective. It is prevalent for vehicle owners or operators to subdue the speed monitoring system by causing a fault in the equipment or disconnecting the network power source in order to disable the system's operability. Furthermore, this system employs a wireless infrared interface for data setting and retrieval, where the transceiver must be linked in a line of sight technique to ascertain a communication link, which generates a constrained viewing angle and thus reduces link establishment flexibility. Striving for a better outcome for the vehicle speed monitoring system, it is presumed to include an anti-tampering functionality to the system to prevent any tampering attempts.

X. Refernces

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